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Applicant Feng Chen
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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of claims:

1. (CURRENTLY AMENDED) A CMP retaining ring, comprising:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;

at least a groove on said lower surface of said retaining ring; and said groove extending from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring;

at least a portion of said groove has a rounded contour or slanted contour[.]; said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom.

2. (CANCELED)

3. (CANCELED)

4. (CANCELED)

5. (CURRENTLY AMENDED) The CMP retaining ring of claim 1 wherein [said groove has at least one rounded corner.] said groove has curved sidewalls with a curved cross sectional shape, rounded bottom corners and a flat horizontal bottom; the rounded bottom corners are between said flat horizontal bottom and said curved sidewalls.

6. (CANCELED)

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7. (ORIGINAL) The CMP retaining ring of claim 1 wherein said groove has rounded top corners adjacent to the lower surface of said retaining ring.

8. (CANCELED)

9. (ORIGINAL) The CMP retaining ring of claim 1 wherein said groove has a width between 1 mm and 30 mm; said groove has a depth between 1 and 15 mm.

10.(CURRENTLY AMENDED) The CMP retaining ring of claim 1 wherein [said groove has vertical sidewalls or sloped sidewalls.]

said groove is comprised of:

rounded top corners near the lower surface of the ring;

said sidewalls are about vertical and flat.

11. (CANCELED)

12.(CURRENTLY AMENDED) The CMP retaining ring of claim 1 wherein said groove has straight sidewalls, ~~and top corners, and bottom corners, and an about horizontal bottom~~; at least one of said bottom corners is are rounded or curvilinear; said bottom corners are adjacent to said horizontal bottom and said straight sidewalls.

13. (CURRENTLY AMENDED) The CMP retaining ring of claim 1 wherein said retaining ring [can] further [comprise] comprises other channels; the lower surface of the retaining ring [can] further [comprise] comprises a plurality of protrusions and recesses or a mixture of both.

14. (CURRENTLY AMENDED) A process for chemical-mechanical polishing a substrate comprising:

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said substrate is disposed within a polishing head facing a polishing table; said substrate is retained within the polishing head by a retainer ring,

said retaining ring is comprised of:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of the substrate;

at least a groove on said lower surface of said retaining ring; and
said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners
between said sidewalls and said flat bottom;

[at least a portion of said groove has a rounded contour;]

supplying a slurry to said polishing table or to said polish head;

moving the polishing table and/or the polishing head to chemically polish the wafer.

15. (ORIGINAL) The process of claim 14 which further includes: said substrate is a wafer; forming a deposition layer on the surface of said wafer and chemical mechanically polishing said deposition layer.

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (CURRENTLY AMENDED) The process of claim 14 wherein [said groove has at least one rounded bottom corner.] and said groove extends from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring.

20. (CANCELED)

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21. (ORIGINAL) The process of claim 14 wherein said groove has rounded top edges adjacent to the lower surface of said retaining ring.
22. (ORIGINAL) The process of claim 14 wherein said groove has a width between 1 and 30 mm; said groove has a depth between 1 and 15 mm.
23. (NEW) The process of claim 14 wherein said groove has curved sidewalls with a curved cross sectional shape, rounded bottom corners and a flat horizontal bottom; the rounded bottom corners are between said flat horizontal bottom and said curved sidewalls.
24. (NEW) The process of claim 14 wherein
said sidewalls are about vertical flat sidewalls,
said flat bottom is an about horizontal flat bottom, and
said rounded bottom corners are two rounded bottom corners between
said vertical flat sidewalls and said about horizontal flat bottom.
25. (NEW) The process of claim 14 wherein said groove is comprised of:
rounded top corners near the lower surface of the ring;
said sidewalls are about vertical flat sidewalls.
26. (NEW) The process of claim 14 wherein
said sidewalls are flat sloped sidewalls.
27. (NEW) The process of claim 14 wherein said groove is comprised of a rounded top corner, flat sloped sidewalls; the flat bottom, two rounded bottom corners between said flat sloped sidewalls and the flat bottom;
the rounded top corners are adjacent the lower surface of the ring.

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28. (NEW) The CMP retaining ring of claim 1 wherein said sidewalls are flat sloped sidewalls;

said groove is comprised of two rounded bottom corners between the sidewalls and the flat bottom;

said groove has a rounded top corner near the lower surface of the ring.

29. (NEW) The CMP retaining ring of claim 1 wherein said groove is comprised of rounded top corners, flat sloped sidewalls; a flat horizontal bottom, two rounded bottom corners between said flat sloped sidewalls and the flat horizontal bottom; the rounded top corners are adjacent the lower surface of the ring.

30. (NEW) A CMP retaining ring, comprising:

an inner peripheral surface;

an outer peripheral surface;

a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;

at least a groove on said lower surface of said retaining ring;

said groove is comprised of: sidewalls, a flat bottom, rounded bottom corners between said sidewalls and said flat bottom.

31. (NEW) The CMP retaining ring of claim 30 which further comprises: said sidewalls have a curved cross sectional shape, and said flat bottom is horizontal.

32. (NEW) The CMP retaining ring of claim 30 which further comprises:

said sidewalls are flat sloped sidewalls;

said flat bottom is a flat horizontal bottom.

33. (NEW) The CMP retaining ring of claim 30 wherein

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said sidewalls are flat sloped sidewalls;
said flat bottom is a flat horizontal bottom;
said groove further comprises rounded top corners near the lower surface of the ring and adjacent to said flat sloped sidewalls.

34. (NEW) The CMP retaining ring of claim 30 which further comprises:

said sidewalls are flat vertical sidewalls;
said flat bottom is a flat horizontal bottom.

35. (NEW) The CMP retaining ring of claim 30 wherein

said sidewalls are flat vertical sidewalls;
said flat bottom is a flat horizontal bottom;
said groove further comprises rounded top corners near the lower surface of the ring and adjacent to said flat vertical sidewalls.

36. (NEW) The CMP retaining ring of claim 30 wherein and said groove extends from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring.